Claims

80. A method for regulating a milking process, said method comprising the steps of

    i)   identifying at least one volume of milk,

    ii)   assessing particles in the identified volume by either

        a) counting of substantially individual somatic cells in the volume of milk, or

        b) assessing at least one property of at least one biological particle in the volume of milk,

    iii)   obtaining at least one result of the assessment of particles in the identified volume of milk,

    iv)   providing at least one predetermined milk quality parameter,

    v)   correlating the at least one result obtained in step iii) with the predetermined milk quality parameter provided in step iv),

    vi)   transferring any one or both of

        c) the at least one result obtained in iii), and

        d) the correlation obtained in v)

        to regulating means capable of regulating the milking process of at least a portion of the milk being milked, and

    vii)   regulating the milking process based on any one or both of c) the at least one result obtained in iii), and d) the correlation obtained in v).

81. A method according to claim 80, said method further comprising assessing one or more chemical or physical property of the milk, said assessment preferably being made substantially simultaneously with the assessment of the particles in the identified volume of milk.

82. A method according to claim 80, wherein the assessment of particles is the counting of biological particles present in the milk, the biological particles having diameter of more than 0.1 mm, preferably the biological particles having diameter of more than 0.5 mm, more preferably the biological particles having diameter of more than 1 mm, more preferably the biological particles having diameter of more than 2 mm, more preferably the biological particles having diameter of more than 5 mm.

83. A method according to claim 80, wherein the biological particles are one or several of: particles containing protein, particles containing somatic cells, particles containing body tissue.

84. A method according to claim 80, wherein the assessment of particles is the counting of blood particles.

85. A method according to claim 81, wherein the assessment of one or more chemical properties is the estimation of the concentration and/or the level of one or more of: fat, protein, lactose, citric acid, urea, haemoglobin, ketones, carbon dioxide, oxygen, pH, potassium, calcium, sodium.

86. A method according to claim 81, wherein the assessment of one or more physical properties is the measurement of one or more of: temperature, conductivity, light scatter.

87. A method according to claim 80, wherein the counting of the number of individual somatic cells and/or the assessment of one or more particles is done for one or more individual quarter(s).

88. A method according to claim 81, wherein the assessment of one or more chemical properties and/or the assessment of one or more physical property is done for one or more individual quarter(s).

89. A method according to claim 80, wherein the regulation of the handling of the milk is done individually for milk from one or more quarter(s).

5   90. A method according to claim 80, wherein the assessment of particles in the milk, and/or the assessment of one or more chemical or physical property of the milk is done substantially before and/or after the identification of the individual animal being milked, preferably where the identification is done by identification means reading one or more data carried by the individual animal.

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91. A method according to claim 80, wherein the regulation of the handling of the milk is directing the milk to one or more storage means and/or outlets.

92. A method according to claim 80, wherein at least one of the result of the
15   assessment of the volume of milk is/are transferred to a storage means, preferably where the result is/are identified by identification of the animal, the data of the storage means being available to computing means.

93. A method according to claim 80, wherein the assessment of particles is performed
20   by automated microscopy performed by creating a spatial image representation of electromagnetic irradiation from an exposing domain containing a sample of the milk and performing a quantitated detection of the image.

94. A method according to claim 93, wherein the volume of the liquid sample from
25   which electromagnetic radiation is irradiated is detected is in the range between 0.01 µl and 20 µl, preferably in the range between 0.04 µl and 4 µl.

95. A method according to claim 93, wherein the signal which is detected for the assessment of particle is a signal which is substantially caused by attenuation of
30   electromagnetic signal, and/or by emission of electromagnetic irradiation by photoluminescence, the attenuation and/or the photoluminescence being associated to one or more molecules which is/are a part of the particle, preferably where the particles are somatic cells and where the molecules are DNA and/or proteins.

96. A method according to claim 95, wherein the signal which is detected for the assessment of particles substantially originates from one or several types of molecules of types which bind to, are retained within, or interact with, the particles, such molecules being added to the sample before or during exposure of electromagnetic signals, the molecules being molecules giving rise to one or several of the following phenomena: attenuation of electromagnetic radiation, photoluminescence when illuminated with electromagnetic radiation, scatter of electromagnetic radiation, raman scatter.

97. A method according to claim 96, wherein an effective amount of one or more nucleic acid dyes and/or one or more potentiometric membrane dyes is added.

98. A method according to claim 97, wherein there is/are added one or more nucleic acid dyes selected from the group consisting of: phenanthridines (e.g. ethidium bromide CAS#: 1239-45-8, propidium iodide CAS#: 25535-16-4), acridine dyes (e.g. acridine orange CAS#: 65-61-2/CAS-10127-02-3), cyanine dyes (e.g. TOTO™-1 iodide CAS#: 143 413-84-7 -Molecular Probes, YO-PRO™-1 iodide CAS#: 152 068-09-2 -Molecular Probes), indoles and imidazoles (e.g. Hoechst 33258 CAS#: 023 491-45-4, Hoechst 33342 CAS#: 023 491-52-3, DAPI CAS#: 28718-90-3, DIPI (4',6-(diimidazolin-2-yl)-2-phenylindole)), preferably wherein the nucleic acid dye added is propidium iodide CAS#: 25535-16-4.

99. A method according to claim 96, wherein any chemical added has the effect of aiding in the binding of one or more dyes to a particle, preferably such chemical being t-Octylphenoxypolyethoxyethanol (Triton X-100).

100. A method according to claim 96, wherein any chemical added has the effect of increasing the rate of dissolution or solubilisation of any chemical on substantially solid, and/or substantially non-aqueous, and/or substantially freeze dried form, preferably such chemical being one or more types of organic or inorganic salts.

101. A method according to claim 81, wherein the assessment of any chemical
       property is based on spectrophotometric measurement, the spectrophotometric
       measurement being, e.g., one or several of; mid-infrared attenuation, near-infrared
       attenuation, visible attenuation, ultra-violet attenuation, photoluminescence, raman
    5 scatter, nuclear magnetic resonance and/or wherein the assessment of any
       chemical property is based on potentiometric measurement, preferably by the use
       of an ion selective electrode.

102. A method according to claim 80, wherein the volume of milk being assessed is a
   10 sample of milk which is undiluted, except for the addition of the reagents used in the
       assessment, preferably the reagents being on a substantially solid, and/or
       substantially non-aqueous, and/or substantially freeze dried form.

103. A method according to claim 80, wherein at least a part of the volume of milk
   15 being assessed is acquired and/or identified substantially at the beginning of
       milking, preferably before 100 ml of milk have been milked, more preferably before
       20 ml of milk have been milked, more preferably before 5 ml of milk have been
       milked.

   20 104. A method according to claim 80, wherein at least one of the assessment of
       particles, or chemical or physical property of milk is performed in a substantially
       disposable device, preferably where the device is discarded or disposed of after the
       assessment of a predetermined number of volumes of milk, and/or is disposed of in
       the event it becomes at least partially blocked, and/or is discarded or disposed of in
   25 the event it has become substantially empty of any chemical or reagent used for the
       assessment.

105. A method according to claim 80, wherein at least one of the assessment of
       particles, or chemical or physical property of milk is performed in a domain where at
   30 least one physical dimension of the domain substantially partly determines the
       volume of the domain, and where the at least one physical dimension is
       substantially different during at least a part of any period when a sample is
       introduced to the domain and at least a part of any period when a measurement or

detection is performed, preferably where the effect is such that the volume of the domain is substantially larger during at least a part of any period when a sample is introduced to the domain than in at least a part of any period when a measurement or detection is performed.

106. A method according to claim 80, wherein at least one of the assessment of particles, or chemical or physical property of milk is activated or controlled by the controlling means controlling the milking.

107. A system for regulating a milking process, said system comprising

    i)   detecting means for identifying at least one volume of milk,

    ii)   means for assessing particles in the identified volume by either

        a) counting of substantially individual somatic cells in the volume of milk, or

        b) assessing at least one property of at least one biological particle in the volume of milk

    iii)   storage means for storing and providing at least one result of the assessment of particles in the identified volume of milk,

    iv)   storage means for storing and providing at least one predetermined milk quality parameter,

    v)   processing means for correlating the at least one result provided in iii) to the at least one predetermined milk quality parameter provided in iv), and

    vi)   means for regulating the milking process based on the correlation obtained in step v).

108. A system according to claim 107, said system further comprising means for assessing at least one chemical or physical property of the milk, said assessment being preferably made substantially simultaneously with the assessment of the particles in the identified volume of milk.

109. A system according to claim 108, wherein the assessment of one or more chemical properties is the estimation of the concentration and/or the level of one or more of: fat, protein, lactose, citric acid, urea, haemoglobin, ketones, carbon dioxide, oxygen, pH, potassium, calcium, sodium.

110. A system according to claim 108, wherein the assessment of one or more physical properties is the measurement of one or more of: temperature, conductivity, light scatter.

111. A system according to claim 107, wherein the assessment of individual somatic cells and/or the correlation of the counting to a value substantially representing the number of somatic cells per volume of milk is done for one or more individual quarter(s).

112. A system according to claim 107, wherein the regulation of the handling of the milk is done individually for milk from one or more quarter(s).

113. A system according to claim 107, further comprising detection means for identifying the animal and one or more information concerning the time of previous milking and/or one or more information concerning the health of the animal.

114. A system according to claim 107, wherein the regulation of the handling of the milk is directing the milk to one or more storage means and/or outlets.

115. A system according to claim 107, wherein at least one of the result of the assessment of the volume of milk is/are transferred to a storage means, wherein the result of identification of the animal is stored, the data of the storage means being available to computing means.

116. A system according to claim 107, wherein the milking apparatus is a automatic milking system.

117. A system according to claim 107, wherein the assessment of particles is performed by automated microscopy performed by creating a spatial image representation of electromagnetic irradiation from an exposing domain containing a sample of the milk and performing a quantitated detection of the image.

118. A system according to claim 117, wherein the volume identified is in the range between 0.01 µl and 20 µl, preferably in the range between 0.04 µl and 4 µl.

119. A system according to claim 108, wherein the assessment of any chemical property is based on spectrophotometric measurement, the spectrophotometric measurement being, e.g., one or several of; mid-infrared attenuation, near-infrared attenuation, visible attenuation, ultra-violet attenuation, photoluminescence, raman scatter, nuclear magnetic resonance, and/or wherein the assessment of any chemical property is based on potentiometric measurement, preferably by the use of an ion selective electrode.

120. A system according to claim 107, wherein the volume of milk being assessed is a collected at different times during milking, preferably where the result of one or more assessment can be correlated to the property of the entire milk being milked.

121. A system according to claim 107, comprising a substantially disposable device comprising a sample compartment.

122. A system according to claim 107, wherein at least one of the assessment of particles, or chemical or physical property of milk is performed in a domain where at least one physical dimension of the domain substantially partly determines the volume of the domain, and where the at least one physical dimension is substantially different during at least a part of any period when a sample is introduced to the domain and at least a part of any period when a measurement or detection is performed, preferably where the effect is such that the volume of the domain is substantially larger during at least a part of any period when a sample is introduced to the domain than in at least a part of any period when a measurement or detection is performed.

123. A system according to claim 107, wherein at least one of the assessment of particles, or chemical or physical property of milk is activated or controlled by the controlling means controlling the milking.

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